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# Twelve New Species of *Merostachys* (Poaceae: Bambusoideae: Bambuseae) from Brazil

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**ABSTRACT.** Ten new species of *Merostachys*, *M. annulifera*, *M. argentea*, *M. bifurcata*, *M. calderoniana*, *M. lanata*, *M. leptophylla*, *M. magnispicula*, *M. medullosa*, *M. procerrima*, and *M. ramosissima*, from the state of Bahia, Brazil, and two, *M. fimbriata* and *M. rondoniensis*, from the state of Rondônia, Brazil, are described and illustrated. Some new and unusual characteristics for the genus (the branching of the main culm) in *M. ramosissima*, *M. fimbriata*, and *M. annulifera* are discussed.

In preparing a revision of the genus *Merostachys* Sprengel (Sendulsky, 1992, 1995), examination of herbarium material revealed ten undescribed species collected in the state of Bahia and two from Rondônia, Brazil, where the Bambusoideae appear to be one of the most successful and diverse groups of grasses, its members having adapted to these rich tropical rainforests.

Five of the species, *M. argentea*, *M. bifurcata*, *M. calderoniana*, *M. fimbriata*, and *M. procerrima*, are known only from vegetative material.

In daring to describe a new species based solely on sterile material I wish to make future bamboo collectors aware of the existence of these species and encourage them to search more objectively for additional, fertile collections, which may complete the present study.

The typical branching pattern for *Merostachys* and also for some species of *Arthrostylidium* and *Rhipidocladum* (the branch complement of apsidate insertion, McClure, 1973) consists of several to many, fasciculate, laterally oriented, slender, subequal, verticillate, leafy branches borne from a single bud at each node, alternately or distichously located and forming dense whorls, along a main culm.

## BRANCHING MORPHOLOGY

Some of the new species (e.g., *M. ramosissima* and *M. fimbriata*) present unexpected, previously undescribed features for the genus *Merostachys*—the branching of the main culm with side branches of the first order that arise from some nodes and

reach at times 7 m in length. These long branches also rebranch and produce leafy complements of apsidate insertion at each node. This unusual branching was first indicated in field notes by the late T. R. Soderstrom, collector of *M. ramosissima*. The rebranching was also mentioned only on the labels of *M. fimbriata* (holotype) by its collector Cleofe Calderón and of *M. annulifera* (Calderón, Santos & Oliveira 2405).

The collections of these three species always have long, leafy, first order branches with large leaves, referred to as “major culm leaves” or the “major culm leaf complement” (see discussions of *M. ramosissima* and *M. fimbriata*). The branch leaves of the second order branches or “side branch leaf complements” are smaller than those produced by the first order branches. Some other species—*M. medullosa*, *M. procerrima*, *M. magnispicula*, and *Merostachys* sp. (Thomas, Carvalho, Jardim & Sant’Ana 9889, MO, NY, SP)—apparently present a similar branching pattern as indicated by the presence of two sizes of leaves. In available specimens of the two latter species, the plants are in flower, and the flowering branches are of two orders, that is, the long leafy branches of the first order (Fig. 7) and smaller branch complements of the second order from “side branches” (Fig. 10e). The leaves on the long leafy branches of the first order in nearly all of the above-mentioned species share carinate sheaths with wide and hard keels.

Without understanding this peculiar branching pattern, it would have been impossible to accurately describe the species and compose the key. Because of the great differences in size of the branches and branch leaves, it will be difficult to correctly identify specimens unless there is an indication as to what part of the plant they came from. More fieldwork and precisely directed collecting are needed to fully understand these different morphological patterns.

Smaller leafy complements with smaller leaves may be of two different origins and sizes: (1) normal branch complements, developed directly from a main culm (monoclade branch complements of apsidate insertion) and usually densely and verticil-



lately arranged at every node of a main culm; and (2) small branch complements (mostly of a few branches) developed on each node of the thinner “side branches” (the long branches of the first order, which were produced by the “major culm node”). Both types of smaller branch complements are used in the key, except in the lead 8’, where blades of the large branch complement and the smaller branch complements are called normal branch complements.

KEY TO THE NEW SPECIES OF *MEROSTACHYS* FROM THE STATES OF BAHIA AND RONDÔNIA, BRAZIL

1.

Branch leaf blades delicate, linear-lanceolate, 0.4–0.8 cm wide

2
- 1’.

Branch leaf blades not so delicate, lanceolate, long-lanceolate, or broadly lanceolate

4
- 2(1).

Oral setae of the branch leaves whitish, slightly undulate, not dense, spreading in all directions like spiders’ legs

*M. leptophylla*
- 2’.

Oral setae of the branch leaves erect, uprightly adhering, not very evident, sometimes absent

3
- 3(2).

Oral setae of the branch leaves white-brownish, sometimes absent; culms 0.75–1.25 cm diam., scabrous; oral setae of the culm leaves white at the base, brownish at the points, 6–8 mm long; inner ligule of the culm leaf ca. 6 mm long, bifurcate

*M. bifurcata*
- 3’.

Oral setae of branch leaves white-yellowish, brilliant; culms 2.3–2.6 cm diam., smooth; oral setae of the young culm leaves up to 3 cm long, silvery-white, brilliant, undulate, apically crispate; inner ligule of the culm leaf ca. 1 mm long, truncate

*M. argentea*
- 4(1).

Branch leaf blades lanceolate, 7–8 cm long, 0.8–1.5 cm wide or long-lanceolate, 10.5–13 cm long, 0.7–1.1 cm wide

5
- 4’.

Branch leaf blades oblong-lanceolate or long-lanceolate, (1–)1.6–3 cm wide

6
- 5(4).

Blades lanceolate, 7–8 cm long, 0.8–1.5 cm wide; oral setae curly, dense, whitish, cottonlike; culm leaf sheaths glabrous

*M. calderoniana*
- 5’.

Blades long-lanceolate, 10.5–13 cm long, 0.7–1.1 cm wide; oral setae straight, scarce, golden reddish; culm leaf sheaths lanate

*M. lanata*
- 6(4).

Blades 7–20 cm long, (1–)1.6–3 cm wide

7
- 6’.

Blades 4–16 cm long, 1–3.5 cm wide

8
- 7(6).

Blades oblong-lanceolate, 7–20 cm long, 2.2–3 cm wide, asymmetrical (groups of larger leaves may be present); culm internodes hollow; oral setae white, dense, silky, neatly arranged

*M. procerrima*
- 7’.

Blades oblong-lanceolate, 7–11.5 cm long, 1.6–2 cm wide; culm internodes filled with soft pith; oral setae copper-colored, dense, spreading in all directions

*M. medullosa*
- 8(6).

Blades of normal branch complement broadly lanceolate, 7–12 cm long, 2.2–3.5 cm wide or 7.5 cm long, 2.6 cm wide

9
- 8’.

Blades of large flowering branch complement 15–30 cm long, 2.8–4.5 cm wide or blades of normal flowering branch complement 4–13.5 cm long, 1–2.4 cm wide

11
- 9(8).

Nodes thick, black, tirelike, not fringed

*M. annulifera*
- 9’.

Nodes salient, fringed, not thick or black

10
- 10(9).

Oral setae of culm leaves golden, 8–12 mm long; Rondônia

*M. fimbriata*
- 10’.

Oral setae of culm and branch leaves dark at the base and whitish toward the tips, 5–7 mm long; culms branching, branches of the first order ca. 7 m long; Bahia

*M. ramosissima*
- 11(8).

Blades of a normal branch complement 4–13.5 cm long, 1–2.4 cm wide; lower glume ca. 7 mm long, upper glume ca. 9 mm long; Rondônia

*M. rondoniensis*
- 11’.

Blades of a large flowering branch 15–30 cm long, 2.8–4.5 cm wide; lower glume ca. 9 mm long, upper glume 11–12 mm long; Bahia

*M. magnispicula*

SPECIES FROM BAHIA

***Merostachys annulifera*** Sendulsky, sp. nov.  
TYPE: Brazil. Bahia: Município Uruçuca, Estrada Serra Grande–Ilheus, km 2 (Mata de restinga), 20 Oct. 1983 (fl), Santos, Soderstrom et al. 3906 (holotype, SP; isotype, MO). Figure 1.

Ab omnibus speciebus notis foliorum ramorum laminae late-lanceolatae, 7–12 cm latae, nodis crassis, nigris, inflatis differt.

According to collectors’ notes (*Calderón & Santos 2236* and *Santos & Soderstrom et al. 3906*) this bamboo forms dense clumps of ca. 30(50–75) culms, these fistulose, 1–2.5 cm diam., strong, erect, pendulose above, reaching 10–15 m into the

trees. Internodes ca. 57–95 cm long (many filled with water), scabrous, densely covered by small, sharp prickles, the walls 1.5–2 mm thick. Nodes thick, black, tirelike, hard. Culm leaves deciduous, sheaths thick, ca. 30 cm long, 8–10 cm wide, glabrous, somewhat scabrous abaxially, adaxially golden, shiny; oral setae ca. 5 mm long, dense, reddish; blades reflexed, broadly lanceolate, 14–15 cm long, 2–2.5 cm wide; inner ligule short, inconspicuous; outer ligule a short black rim. Branch complement with 20 branches, these 30–35 cm long, 1–3.5 mm thick, glabrous, smooth, 1–2-noded before the leaves, the nodes salient, black, shiny. Branch leaves 3–8 per complement, sheaths tight, glabrous, deeply sulcate, the overlapping margin finely cili-



ate; oral setae 10 mm long, straight or crispate; inner ligule short, finely ciliolate, the hairs whitish; outer ligule a ciliolate, inconspicuous rim; pseudopetiole flat, black, finely puberulent, waxy, 3 mm long; blades 7–12 cm long, 2.2–3.5 cm wide, broadly lanceolate, L:W = 3–3.1. A sterile large branch, ca. 33 cm long with 8 large leaves, blades ca. 20 cm long, 4.5–5.5 cm wide, glabrous, hard (probably from “major culm leaf complement”; see discussion under *M. ramosissima*), without indications from which part of the plant it was collected, sheaths somewhat hardened on the keel, the pseudopetioles black, finely puberulent. Inflorescence terminal on smaller leafy branches, spikelike, 5–7 cm long, with 12–22 spikelets; rachis and pedicels pilose. Spikelets 14 mm long, 2 mm wide, solitary, 1-flowered, attenuate, fusiform, pectinate, secund; Glumes 2, unequal; lower glume 1-nerved, 4 mm long, ca. 1.2 mm wide at the base, dark, finely puberulent; upper glume 10 mm long, 4 mm wide, aristulate, 9-nerved, the nerves dark, carinate, abaxially finely puberulent, the hairs whitish, adaxially shiny, brown, densely dark-spotted, some nerves anastomosing. Lemma 11 mm long, 5 mm wide, lanceolate, coriaceous, 15-nerved, finely puberulent, slightly strigose near the apex, adaxially shiny, dark-spotted. Palea 10 mm long, ca. 1.2 mm wide (folded), coriaceous, 12-nerved, glabrous at the base, finely puberulent apically, sulcate, finely ciliate along the keels, adaxially shiny; rachilla extension as long as the palea or a little longer, light colored, finely puberulent, with a minute rudiment. Lodicules 3, ca. 2 mm long, membranaceous. Ovary elongate, style single, the stigmas 2, plumose. Stamens 3; anthers ca. 5 mm long, black. Caryopsis not seen.

**Phenology.** This species was collected in flower in 1979, 1980, and 1983.

**Distribution.** Brazil, state of Bahia.

**Paratypes.** BRAZIL. **Bahia:** Município de Ibirataia: 23 km N of Ibirataia, on side road connecting with BR-101, Fazenda Macedonia, 250 m, 6 abr. 1976 (st), *Calderón, Santos & Oliveira* 2364 (CEPEC, US); Município de Ilheus: road Olivença–Vila Brazil, ca. 30 km SW of Olivença, near rio Maroim, 22 Feb. 22 1979 (fl), *Calderón & Santos* 2477 (MO, US); 21 km SW of Olivença on road to Vila Brasil (ex Ruinha), Faz. Ipiranga, 70 m, 23 May 1976 (st), *Calderón, Santos & Oliveira* 2447 (US); Município Itajuípe: 4 km N of União Queimada on road to Pimenteira, Braço do Norte of the Serra Geral, Fazenda Cordilhera, on summit of mountain, 705 m, 3 May 1976 (st), *Soderstrom, Russell & Hage* 2185 (CEPEC, US); Município Ituberá: ca. 2 km from Ituberá on road to Gandú, Fazenda Inferno Verde, 230 m, 23 Apr. 1976 (st), *Soderstrom, Russell & Hage* 2158 (CEPEC, SP, US); km 43 of road Gandú–Ituberá, ca. 13°46'S, 39°17'W, 300 m, 23 Apr. 1972 (st), *Calderón & Pinheiro* 2236 (CEPEC, MO,

US); Município Una: Reserva Biológica do Mico-Leão (IBAMA), 46 km N on BA-001, between Ilhéus and Una, 15°09'S, 39°05'W, 14 Nov. 1992 (st), *Thomas, Carvalho, Amorim, Jardim & Lisboa* 9434 (CEPEC); Estação Experimental Lemos Maia, floresta ao lado W da estação, 11 Nov. 1980 (fl), *Rylands & Hage* 49/1980 (CEPEC, MG); 19 km from Una on road to Santa Luzia do Salobro, 145 m, 27 May 1976 (st), *Soderstrom, Russell & Hage* 2232 (CEPEC, SP, US); Road Una–Olivença, 7 km N of Una (mata litorânea), ca. 15°15'S, 39°06'W, 50 m, 12 May 1972 (st), *Calderón & Pinheiro* 2265 (CEPEC, MO, US); road Una–São José do Macuco, 18 km NW of Una, 110 m, 29 Apr. 1976 (st), *Calderón, Santos & Oliveira* 2405 (CEPEC, SP, US); Road Una–Olivença, CEPLAC's Forestal Reserve Lemos Maia, ca. 7 km from Una, 27 Feb. 1979 (fl), *Calderón & Santos* 2488 (MO, US); km 16.8 carretera vieja Una–Olivença (mata de restinga), 60 m, 18 Mar. 1992 (st), *Londoño, Santos & S. Sant'Ana* 730 (CEPEC, SP, US); Estación experimental Lemos Maia de CEPLAC, a orilla de la carretera cerca a las instalaciones, 50 m, 25 Mar. 1992 (st), *Londoño, Carvalho & S. Sant'Ana* 741 (CEPEC, US); Município Uruçuca: Camino de Serra Grande a Ilheus, 8 km de Serra Grande, 50 m, 18 May 1985 (st), *Zuloaga, Martinelli & Caruso* 2471 (MO).

The collectors' notes on the label of *Calderón & Pinheiro* 2236 say “. . . several thick branches from each node, usually 6,” and on the label of *Calderón, Santos & Oliveira* 2405 “. . . many thick branches at the nodes, over a meter long with a large leaf complement.” All these notes indicate the unusual branching in this species. Is it possible that all these collected long branches with large leaves come from those “major culm leafy branches”? This question remains unanswered.

The unusual tirelike, thick, black nodes of this species appear to be autapomorphic characteristics of *M. annulifera*.

***Merostachys argentea*** Sendulsky, sp. nov. TYPE: Brazil. Bahia: Município Porto Seguro, forest slopes of “morro” on Fazenda Carvalho, ca. 26 km W of town of Monte Pascoal, from 380 to 460 m, 15 May 1976 (st), *Soderstrom, Russell & Hage* 2213 (holotype, CEPEC; isotypes, SP, US). Figure 2.

*M. leptophyllae* et *M. bifurcatae* similis sed foliis culmorum setis argenteis praeditis differt.

According to the collectors' notes: common bamboos, forming large clumps, with 25–30 culms, these 15–16 m tall, 2.3–2.6 cm diam., hollow. Internodes usually smooth, sometimes somewhat rough; walls ca. 1 mm thick. Nodes salient, with whitish line below. Culm leaves deciduous, sheaths 18–19 cm long, 9–11 cm wide, dark yellow, opaque, retrorsely finely scabrous toward the upper part, adaxially smooth, shiny, dark yellow; blades reflexed, deciduous, 7–9 cm long, 0.5–0.6 cm wide, attenuate to a fine point; oral setae of young culm



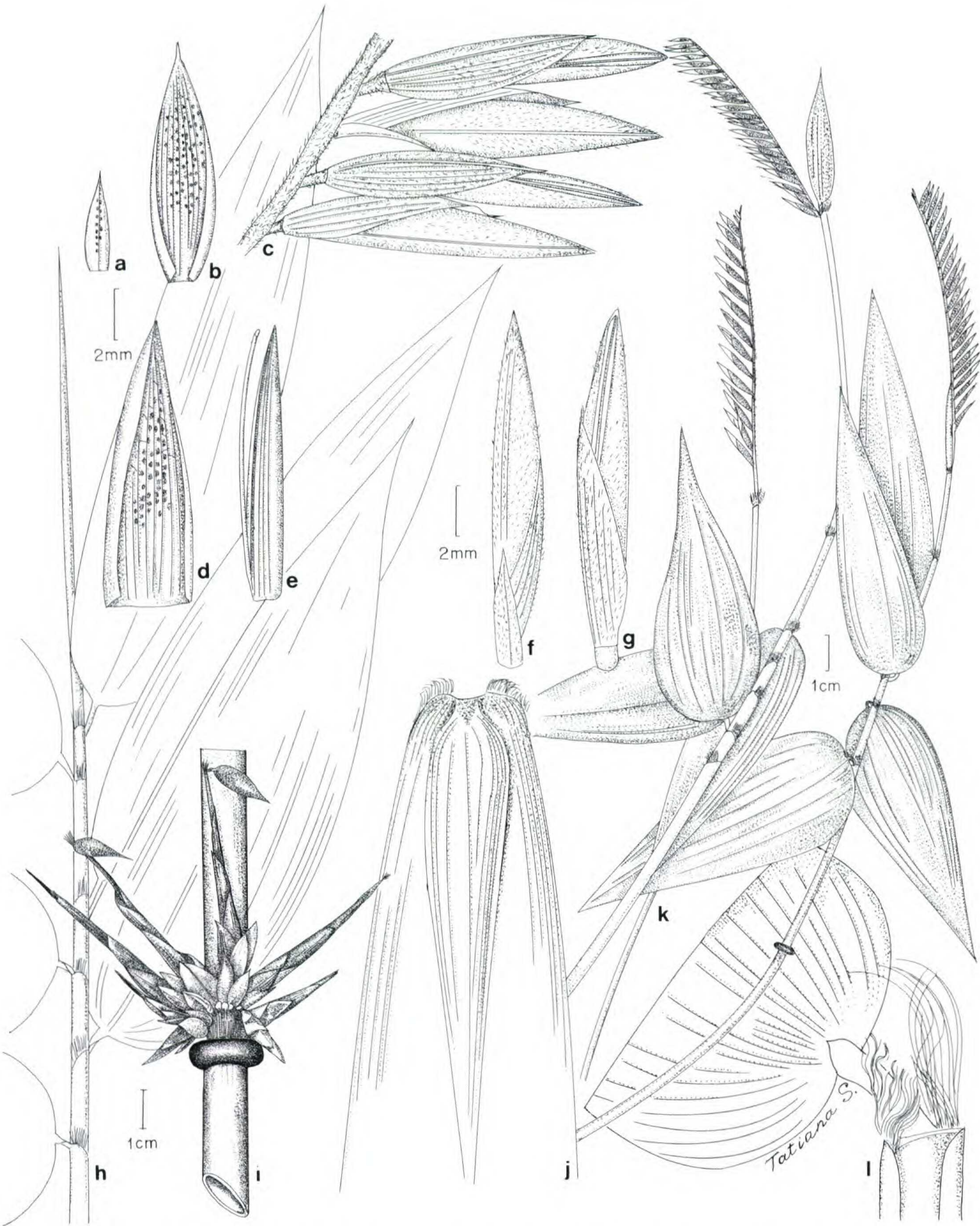


Figure 1. *Merostachys annulifera* Sendulsky. —a. Lower glume. —b. Upper glume. —c. Part of the inflorescence. —d. Lemma. —e. Palea. —f. Spikelet, lemma side. —g. Spikelet, palea side. —h. Large branch with large leaves—“major culm leaf complement” or “major culm leaves.” —i. Branch complement in development. —j. Culm leaf. —k. Flowering branches of the smaller branch complement. —l. Ligule, oral setae, and base of the leaf. Based on Calderón & Pinheiro 2236 and Santos, Soderstrom et al. 3906.



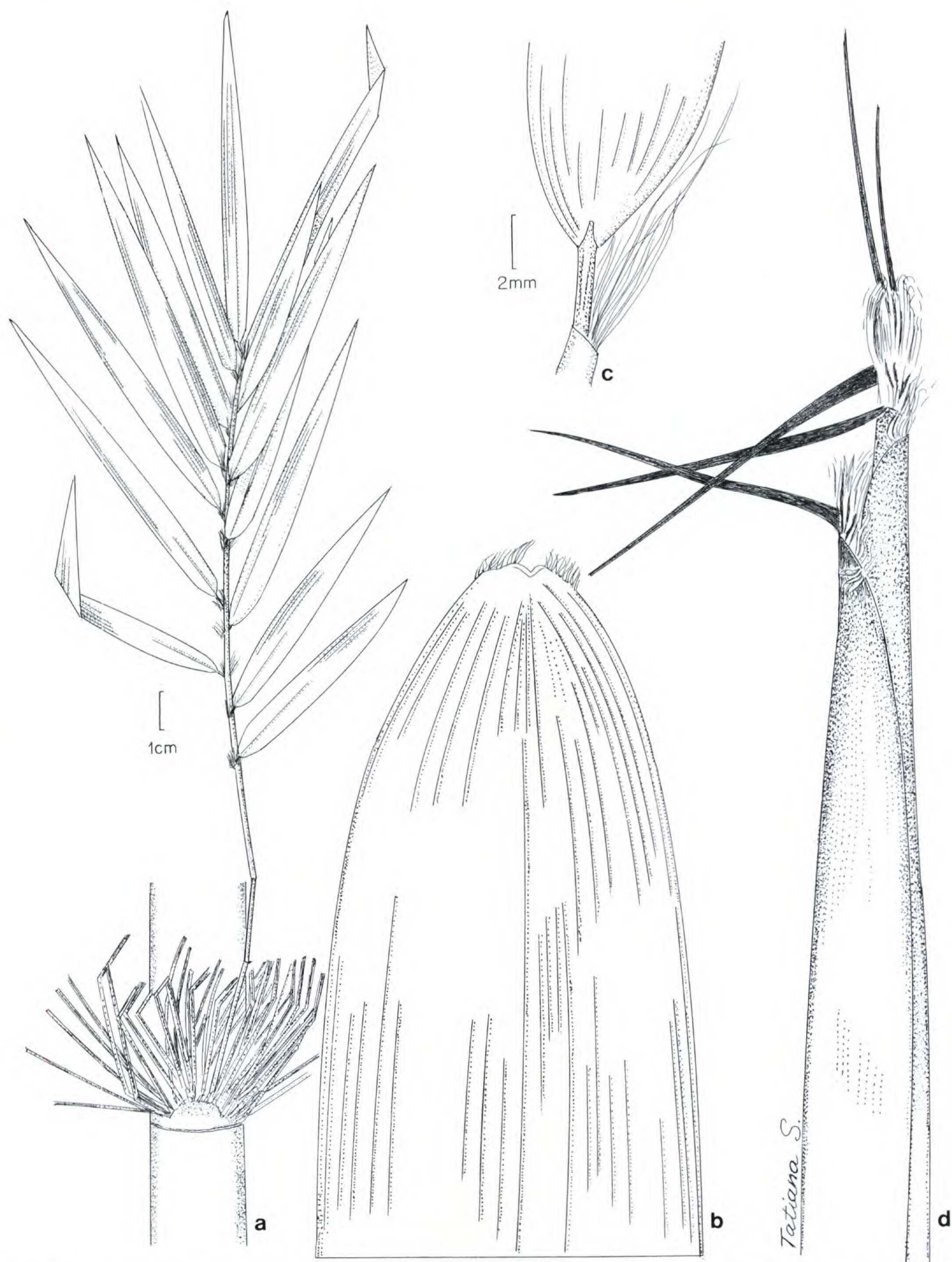


Figure 2. *Merostachys argentea* Sendulsky. —a. Base of the branch complement with a leaf complement. —b. Culm leaf sheath. —c. Oral setae and base of the leaf. —d. Young culm leaves. Based on *Soderstrom, Russell & Hage 2213*.

leaves up to 3 cm long, silvery-white, brilliant, slightly undulate, apically crispate; oral setae of the old sheath yellowish, 1.5 cm long, fine, minutely antrorsely scabrous; inner ligule ca. 1 mm long,

truncate, firm; outer ligule a rim. Branch complement with ca. 130 branches, these 30 cm long, 1 mm thick, 2–3-noded before the leaves. Branch leaves 7–13 per complement, the lower, smaller



leaf distant below; sheaths tight, the upper margin finely ciliate; oral setae ca. 1 cm long, white-yellowish, brilliant, straight or slightly undulate, mostly broken, minutely scabrous; inner ligule a thick, dark membrane, less than 0.5 mm long, whitish on the margin; pseudopetiole black, finely pilose, the hairs white; blades delicate, linear-lanceolate, 8–10 cm long, 0.7–0.8 cm wide. L:W = 11.4–12.5, dull green, glabrous, finely nerved, 2–3 nerves on one side with rows of very fine prickly hairs, the margins finely scabrous. Reproductive structures not seen.

*Phenology.* This species has not yet been collected in flower. The only available specimens of this species are the holotype and isotypes.

*Distribution.* Brazil, state of Bahia.

*Merostachys argentea* has very delicate branch leaves, nearly as delicate as those of *M. leptophylla* and *M. bifurcata*. Because of these features it was frequently associated with these two species. It differs from them by its very long, silvery-white oral setae of the culm leaves. All three species have minute, antrorse hairs on the oral setae of the culm and of the branch leaves.

***Merostachys bifurcata* Sendulsky, sp. nov.**

TYPE: Brazil. Bahia: Município Porto Seguro, Parque Nacional Monte Pascoal, 14 km E of BR 101 at a point 13 km N of Itamarajú, 110 m, 12 May 1976 (st), *T. R. Soderstrom, Russell & Hage* 2202 (holotype, US; isotypes, CEPEC, SP). Figure 3.

Ab omnibus speciebus notis folio culmorum ligula membranacea, ca. 6 mm longa et ca. 5 mm lata, bifurcata differt.

Climbing bamboo, with thin, weak culms reaching 10 m in length, 0.75–1.25 cm diam., erect at first, then arching out and vinelike, drooping over the vegetation. Internodes scabrous, greenish gray, striated dark and light green, with sharp, white prickles; walls thin. Nodes salient. Culm leaves deciduous; sheaths 20–25 cm long, 5–6 cm wide, thin and papery, abaxially scabrous, gray-whitish, partially covered with a rather thick white layer of wax, adaxially smooth, shiny, dark golden brown, sometimes also with spots of wax; inner ligule a thick membrane, ca. 6 mm long, 5 mm wide, bifurcate; outer ligule a fine, dark rim; blades erect to reflexed, 6–7 cm long, 0.3–0.4 cm wide; oral setae white at the base, brownish at the points, straight, slightly undulate, 6–8 mm long. Branch complement with 23–38 branches, these 35 cm long. Branch leaves delicate, 12–14 per complement, the lowermost leaf smaller, distant below; sheaths re-

trorsely scabrous, the upper margin ciliolate; oral setae 3–6 mm long, white-brownish, erect, uprightly adhering, not very evident, sometimes absent; pseudopetiole dark; inner ligule 0.5 mm long, dark, finely ciliolate; outer ligule a rim; blades linear-lanceolate, 3–13 cm long, 0.4–0.8 cm wide, L:W = 7.5–16.2, long acuminate, gray-greenish. Reproductive structures not seen.

*Phenology.* This species has not yet been collected in flower.

*Distribution.* Brazil, state of Bahia.

*Paratypes.* BRAZIL. **Bahia:** Município Belmonte, Reserva Gregorio Bondar of CEPLAC's Estação Experimental, 10 Apr. 1976 (st), *Soderstrom, Russell & Hage* 2138 (CEPEC, SP, US); Município de Ibirataia, 23 km N of Ibirataia, on side road connecting with BR 101, Fazenda Macedonia, 250 m, 5 abr. 1976 (st), *Calderón, Santos & Oliveira* 2359 (CEPEC, MO, US); Município de Porto Seguro, Arraial de Ajuda, Estrada Arraial de Ajuda para Trancoso, 30–40 m, Oct. 1983 (st), *Martinelli & Soderstrom* 9656 (US).

Thomas R. Soderstrom, collector of the type specimen of this species, stated in his notes "...this bamboo grows right within the forest, climbing over the vegetation—the most graceful and beautiful species of the genus that I have seen." It is distinguished from all other species with delicate leaves by the sharply bifurcate inner ligule of the culm leaf.

***Merostachys calderoniana* Sendulsky, sp. nov.**

TYPE: Brazil. Bahia: Município de Una, road Una–Olivença, 20 km N of Una, 70 m, growing in coastal forest on sandy soil, 27 Apr. 1976 (st), *Calderón, Santos & Oliveira* 2400 (holotype, US; isotype, CEPEC). Figure 4.

*M. leptophyllae* similis sed foliorum ramorum laminis lanceolatis, 7–8 cm longis et 8–15 mm latis et setis crispis, densis, albis differt.

Culms, according to collectors' notes, up to 10 m high, 1–1.5 cm diam., fragile, smooth, covered with white wax; young culms thin, asperous. Culm leaves deciduous; sheaths 12–16 cm long, ca. 3 cm wide, abaxially green-grayish, smooth, glabrous, dark-nerved, minutely retrorsely scabrous, covered with white wax, adaxially shiny, dark yellow, sometimes with a thick layer of wax and dark spots, young culm leaves densely transversely nerved toward the apex; oral setae 4–6 mm long, fine, dense, slightly yellowish, minutely antrorsely scabrous; inner ligule 0.5 mm long, indurate, dark, truncate; outer ligule a rim; blade reflexed, 9.5 cm long, 7 mm wide, stiff, asperous. Branch complement with 25–45 branches, these 20 cm





Figure 3. *Merostachys bifurcata* Sendulsky. —a. Young culm leaves. —b. Inner ligule of a branch leaf. —c. Culm leaf. —d. Bifurcate ligule of a culm leaf. —e. Surface of the culm. —f. Branch complement with a leaf complement. Based on Martinelli & Soderstrom 9656.

long, 2–3-noded before the leaves. Branch leaves 5–9(–13) per complement, lower smaller leaf distant below; sheaths tight, densely nerved, the upper margin ciliate; oral setae whitish, dense, curly, sometimes cottonlike, very finely scabrous; inner ligule 0.2 mm long, firm; outer ligule a salient rim; pseudopetiole dark, glabrous; blades lanceolate, glabrous, dull green, 7–8 cm long,

0.8–1.5 cm wide, L:W = 8.7–9.6, 2–3 nerves on one side with rows of very fine prickles, margins smooth or very sparsely scabrous. Reproductive structures not seen.

*Phenology.* This species has not yet been collected in flower.

*Distribution.* Brazil, state of Bahia.



*Paratypes.* BRAZIL. **Bahia:** Município Jaguaquara, ca. 9.5 km SE of Jaguaquara city, Faz. Mundo Novo, 700 m, 13 Apr. 1976 (st), *Calderón, Santos & Oliveira* 2380 (CEPEC, SP, US); 8.5 km E of Jaguaquara city, Fazenda Mundo Novo, ca. 13°32'30"S, 39°55'W, 700 m, 7 May 1972 (st), *Calderón & Pinheiro* 2252 (MO, US); Município de Jaquié, 28 km N of road Ipiáu-Jequié, on road to Apuarema-Jaguaquara, Faz. São João, 750 m, 8 Apr. 1976 (st), *Calderón, Santos & Oliveira* 2369 (CEPEC, MO, US); Município Una, km 35 via Olivença-Una, a 1.5 km por um ramal a la izquierda, 35 m, 17 Mar. 1992 (st), *Londoño, Santos & Sant'Ana* 724 (CEPEC); Reserva Biológica do Mico-Leão (IBDF) km 8 da Rodovia Una-Ilheus BA-001, 28 Oct. 1987 (st), *Santos & Alves* 120 (CEPEC); Reserva Biológica do Mico-Leão, entrance at km 46 of BA-001 Ilheus to Una, about 0.6 km from the main gate, 100 m, 15°09'S, 39°05'W, 6 Feb. 1994 (st), *Carvalho, Clark, Thomas, Kallunki & Sant'Ana* 4370 (SP); Fazenda Santo Antonio ca. 10 km from Una on road to Canavieiras, 26 May 1976 (st), *Soderstrom, Russell & Hage* 2228 (CEPEC, US); Una, ca. 52 km S of Ilheus on M.C. road to Una, 55 m, restinga, 30 May 1991 (st), *Carvalho, Kobayashi & Santos* 3344 (CEPEC); Santa Cruz Cabralia, mata costeira, 7 Nov. 1966 (st), *Belém & Pinheiro* 2857 (CEPEC, US); Município Camacã, boundary of Municípios Camacã and Mascote, 24 km S of Camacã on BR 101, 8 Apr. 1976 (st), *Soderstrom, Russell & Hage* 2130 (CEPEC, SP, US).

A number of similar but distinct species characterized by delicate branch leaves were collected together and sometimes given a provisional specific name. This material was sorted and processed in herbaria by this name or by general aspect, occasionally impeding the bamboo researcher's attempts to understand the species. Thus two new species, *M. leptophylla* and *M. bifurcata*, were primarily distinguished.

During my study of these two new species, I found two additional undescribed species included in this material because of similarity of the delicate leaves. The first, represented by many sterile collections, is named *M. calderoniana* in honor of the prolific collector of this and numerous other bamboo species, colleague and friend Cleofe B. Calderón. This species differs by slightly wider branch leaves and whitish, dense, and curly oral setae. The other one is named *M. argentea* due to the long, striking, silvery-white oral setae of the young culm leaves.

***Merostachys lanata*** Sendulsky, sp. nov. TYPE: Brazil. Bahia: Município de Porto Seguro on road to Eunápolis, forest on white sand, property of Lewis and Iva Lee Hartman, 40 m, 9 May 1976 (fl), *T. R. Soderstrom, Russell & Hage* 2191 (holotype, US; isotypes, CEPEC, SP). Figure 5.

Ab omnibus speciebus notis vaginis foliorum culmorum lanatis differt.

According to the collectors' note: common, graceful bamboo, abundant at the edge of forest, forming very large clumps 1.8 m diam., of ca. 190 closely placed culms, these up to 10–15 m tall, 2.5–3 cm diam.; new culms purplish green, erect, then ascending at maturity and arching way over. Internodes above the nodes yellow and smooth or finely retrorsely scabrous, densely spotted with dark green stripes and spots and with white, short, scattered hairs; internode just below the node dark green, smooth, but longitudinally wrinkled; walls ca. 1 mm thick. Nodes salient, with a flat, ca. 1-mm-wide rim, densely bearded below, the hairs long, white. Culm leaves deciduous, falling at the time of branching; sheaths ca. 30 cm long, 9 cm wide, abaxially softly lanate, the hairs long, dense, brownish white, directed downward, more dense and longer toward the base, but apically glabrous, sparsely, retrorsely scabrous, adaxially shiny, smooth, golden brown, finely nerved; sheaths of the young culm leaves abaxially finely, retrorsely scabrous, then lanate toward the base, adaxially dark and densely tessellate toward the apex, with salient nerves; blades (according to collectors' field notes) borne upright, with age becoming horizontal to retrorse, ca. 10–16 cm long, 0.8–1 cm wide; oral setae ca. 1 cm long, reddish brown, slightly curly, sometimes whitish at the base; inner ligule ca. 1.5 mm long, dark, cartilaginous; outer ligule a short inconspicuous rim. Branch complement with (30–) 50–80 subequal branches, these 15–45 cm long; nodes a dark line. Branch leaves deciduous, 1–5 per complement; sheaths tight, glabrous, very finely ciliate on the upper margin; oral setae 6–8 mm long, straight, mostly scarce, fragile, sometimes dense, golden reddish; inner ligule dark, cartilaginous, irregular, ca. 0.5 mm long; outer ligule a light rim; pseudopetiole dark, glabrous; blades long-lanceolate, 10.5–13 cm long, 0.7–1.1 cm wide, L:W = 11.8–15, finely attenuate, glabrous on both surfaces, adaxially with 2–3 marginal nerves on one side with rows of very fine prickly hairs; margins finely scabrous. Inflorescence 4–6 cm long, terminal on leafy branches with laterally or distichously arranged spikelets, the rachis densely pilose, whitish; pedicels 0.3 mm long, pilose. Spikelets 7.5 mm long, 2 mm wide, attenuate, fusiform. Glumes 2, unequal; lower glume 2.5 mm long, 1/3 the length of the spikelet, 1-nerved; upper glume 5.5 mm long, 2 mm wide, 9-nerved, the nerves anastomosing, midnerve finely denticulate toward the apex. Lemma 7 mm long, 5 mm wide, 11-nerved, lanceolate, abaxially with sparse, long, whitish,



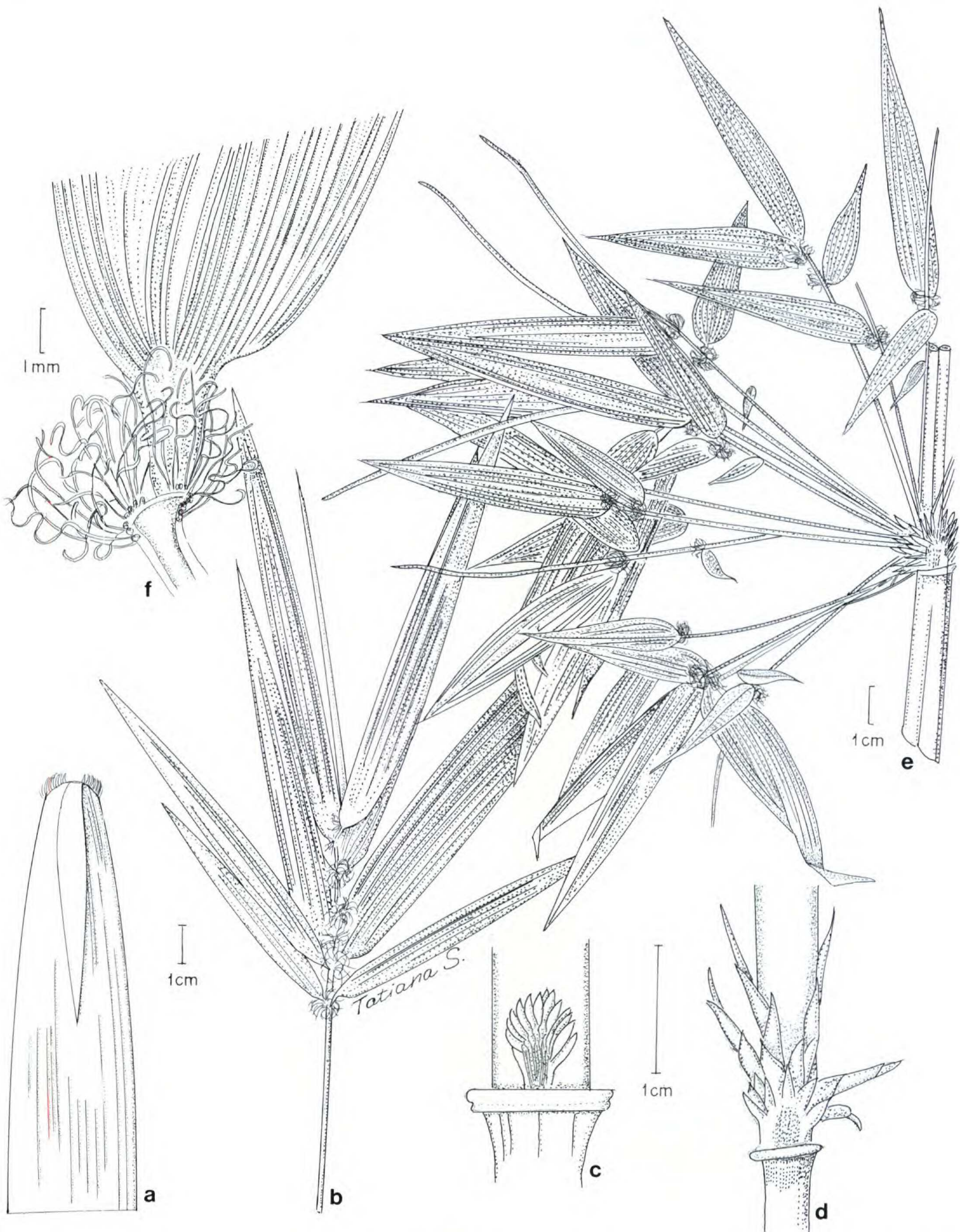


Figure 4. *Merostachys calderoniana* Sendulsky. —a. Culm leaf. —b. Leaf complement. —c, d. Branch complement in development. —e. Half of a normal branch complement. —f. Oral setae, inner ligule, and base of the leaf. Based on Calderón, Santos & Oliveira 2400.

rather thick hairs, adaxially pilose toward the apex. Palea 8.5 mm long, 3 mm wide, 8-nerved, glabrous, ovate-lanceolate, longer than the lemma, the keels of the palea finely denticulate;

rachilla extension bristlelike, with a minute rudiment at the apex. Internode between the upper glume and the lemma 0.75 mm long, 0.75 mm diam., finely pilose, cup-shaped, with perfectly





Figure 5. *Merostachys lanata* Sendulsky. —a. Flowering branch complement. —b. Lower glume. —c. Spikelet. —d. Upper glume. —e. Lemma. —f. Palea. —g. Internode between the upper glume and the lemma. —h. Apical part of lemma. —i. Rachilla extention between the palea keels. —j. Culm leaf. —k. Culm leaf sheath. —l. Caryopsis. —m. Leaf complement. —n. Inner ligule of a branch leaf. —o. Oral setae and bases of the leaves. Based on *Soderstrom, Russell & Hage 2191*.



circular borders. Ovary elongate-fusiform, rostrate, with two long styles, stigmas not seen. Stamens 3; anthers 12 mm long, black. Caryopses 3.5–4 mm long, ca. 2.5 mm thick, ovoid, light brown, with one side asymmetrically swollen.

**Phenology.** This species was collected in flower only in 1976.

**Distribution.** Brazil, state of Bahia.

**Paratypes.** BRAZIL. **Bahia:** Município Belmonte: 27 km SW of Belmonte, forest on sand with bamboo predominant, 30 m, 11 Apr. 1976 (fl), *Soderstrom, Russell & Hage 2146* (SP, US); 24 km SW of Belmonte on road to Itapebí (restinga forest), low restinga and damp open areas on white sand, 0 m, approx. 39°03'W, 16°00'S, 24 Mar. 1974 (fl), *Harley 17388* (MO, US); Maraú, ca. 2 km of Maraú, mata hidrófila (road side), 0 m, 22 May 1991 (st), *Carvalho, Kobayashi & Pennington 3340* (CEPEC); Município de Porto Seguro: 8 km W of Porto Seguro, ca. 16°25'30"S, 39°8'W, 70 m, 4 Apr. 1972 (st), *Calderón & Pinheiro 2199* (CEPEC, MO, US); Parque Nacional Monte Pascoal, 14 km E of BR 101 at a point 13 km N of Itamarajú, forest on slopes of Monte Pascoal, 385 m, 13 May 1976 (st), *Soderstrom, Russell & Hage 2207* (CEPEC, SP, US); Município Santa Cruz Cabralia: 9 km SW of Santa Cruz Cabralia on road to Porto Seguro, restinga forest on white sand, 25 m, 9 May 1976 (st), *Soderstrom, Russell & Hage 2192* (CEPEC, SP, US).

*Merostachys lanata* is characterized by its lanate culm leaf sheaths and apparently is restricted to the sandy soil of the restinga forests. It shows some affinity with *Merostachys fischeriana* in the inflorescences with small spikelets, but differs by its sparsely pilose lemma.

***Merostachys leptophylla* Sendulsky, sp. nov.**

**TYPE:** Brazil. Bahia: Município Ibicaraí, between Ibicaraí and Floresta Azul, at 7 km from Ibicaraí, 270 m, 3 Apr. 1976 (fl), *T. R. Soderstrom, Russell & Hage 2106* (holotype, US; isotypes, CEPEC, SP). Figure 6.

*M. calderonianae* et *M. bifurcatae* similis sed setis tenuibus, effusis similitudine araneorum pernae differt.

Culms 9–12 m tall, 12–15 mm diam., smooth, green-grayish, the upper tips scabrous, the culm walls 1 mm thick. Nodes slightly salient, light-colored, glabrous. Culm leaves deciduous; sheaths 12–13 cm long, 3–4 cm wide, smooth, dark-spotted, adaxially smooth, shiny, with numerous transverse veins; blades reflexed, 8.5–13 cm long, 0.7–0.8 cm wide, deciduous, shortly strigose adaxially, abaxially glabrous or finely puberulent; inner ligule ca. 0.5 mm long, dark, cartilaginous; outer ligule an inconspicuous rim; oral setae 6–8 mm long, undulate, dense, curly at the tips, yellowish, brownish at the points, minutely scabrous. Branch complement with 50–65 very thin branches, these 30 cm

long, 1 mm or less thick, 2–3-noded before the leaves. Branch leaves 5–11 per complement; sheaths tight, glabrous; oral setae fine, whitish, slightly undulate, borne on the very edge of the sheath on dark, amorphous, tuberculous bases, spreading in all directions like spiders' legs; pseudopetiole ca. 1.5 mm long, light green, nearly white, glabrous; blades delicate, long, linear-lanceolate, attenuate apically, slightly asymmetrical, 6.5–10 cm long, 0.4–0.8 cm wide, L:W = 12.2–16.5, green-grayish, more prominently nerved abaxially, adaxially with 2–3 marginal nerves on one side with rows of very fine prickly hairs, the margins scabrous. Inflorescence spike-like, pectinate or with distichously arranged spikelets, 2–3.5 cm long, with 4–9 spikelets, terminal on leafy branches, these bearing smaller leaves than those of the sterile branch complement; rachis densely pilose, the hairs whitish; pedicels pilose, 1.5 mm long. Spikelets ca. 8 mm long, 2.75 mm wide, fusiform, attenuate apically, glabrous. Glumes 2, unequal; lower glume 2 mm long, 1-nerved; upper glume ca. 6.5 mm long, 3.5–4 mm wide, ovate, attenuate, brownish, glabrous, opaque, rough, 7–9-nerved. Lemma ca. 7.5 mm long, hardened, fusiform, dark yellow, tightly embracing the palea. Internode between the upper glume and the lemma 0.25 mm long. Palea 6.5 mm long, hardened, fusiform, dark yellow, a little shorter than the lemma, very narrowly sulcate. Prolongation of the rachilla bristlelike, as long as the palea, light yellow, glabrous, with a minute rudiment, tightly enclosed between the keels of the palea. Internode between the lemma and the palea 0.75 mm long. Ovary ca. 1 mm long, rostrate. Caryopsis not seen.

**Phenology.** The only flowering specimen of this species is the type.

**Distribution.** Brazil, state of Bahia.

**Paratypes.** BRAZIL. **Bahia:** Município Porto Seguro, Parque Nacional de Monte Pascoal, Monte Pascoal, ca. 16°54'S–39°24'W, 210 m, 6 Apr. 1972 (st), *Calderón & Pinheiro 2202* (CEPEC, MO, SP, US); located 14 km E of BR 101, at a point 13 km N of Itamarajú, 110 m, 12 May 1976 (st), *Soderstrom, Russell & Hage 2204* (CEPEC, SP, US).

This is the most delicate species in the small group comprised by *Merostachys leptophylla*, *M. bifurcata*, and *M. argentea* with very narrow, delicate, green-grayish blades. According to the collectors' notes, the plant here described forms a dense clump of several hundred slender, weak, hollow culms, reaching into the trees. *Merostachys leptophylla* is distinguished by the most delicate leaves





Figure 6. *Merostachys leptophylla* Sendulsky. —a. Flowering branch complement. —b–f. Development of the branch complement. —g. Ovary. —h. Lodicules. —i, j. Palea. —k, l. Lemma. —m. Upper glume. —n. Lower glume. —o. Spikelet. —p. Leaf complements. —q. Oral setae of the branch leaves. —r, s. Culm leaf. —t. Inner ligule. Based on Soderstrom, Russell & Hage 2106 and Calderón & Pinheiro 2202.

and by white, not dense, slightly curly, oral setae spreading in all directions like spiders' legs.

***Merostachys magnispicula*** Sendulsky, sp. nov.  
 TYPE: Brazil. Bahia: Ilheus, Salobrinho, 18 Dec. 1968 (fl), Almeida & Santos 289 (holotype, CEPEC). Figure 7.

*M. rondoniensi* similis sed laminis ramorum floriferorum 15–30 cm longis et 28–45 mm latis, spiculis 13–15 mm longis et 4 mm latis differt.

Habit unknown; only fragments of the branch complement available. A large branch 41 cm long, terminating in inflorescence, with cut off base, the lower part covered by sheaths, these glabrous, hard,



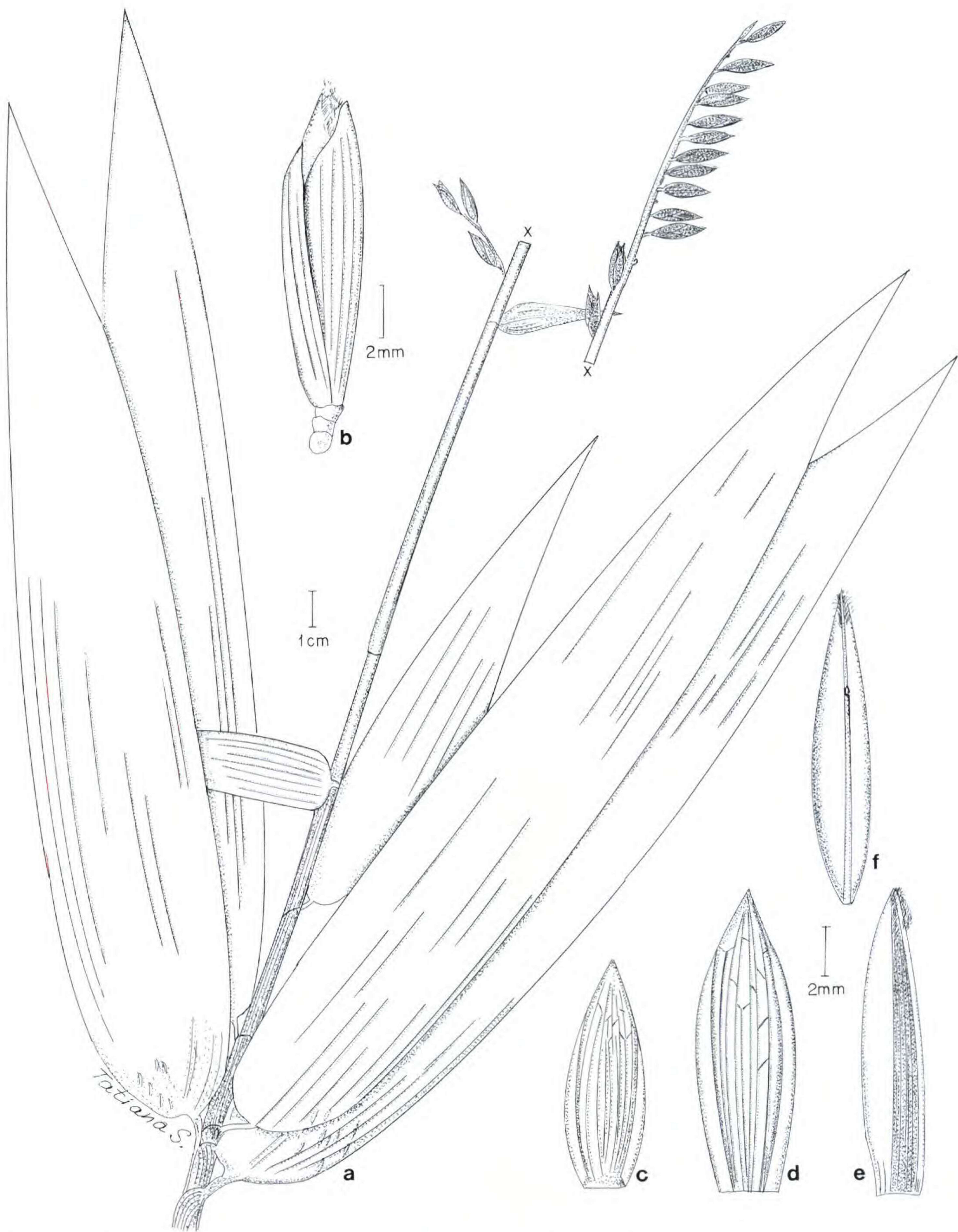


Figure 7. *Merostachys magnispicula* Sendulsky. —a. Large flowering branch with large leaves. —b. Spikelet. —c. Lower glume. —d. Upper glume. —e. Lemma. —f. Palea. Based on Almeida & Santos 289.

somewhat broadly carinate, strongly nerved, transversely finely rugose between the nerves; outer ligule a cartilaginous rim; inner ligule and the abaxial side of the leaves not seen; sometimes 3–4 very small and weak oral setae present at the top of the

sheath; pseudopetiole ca. 1 cm long, 3 mm wide, light-colored, transversely rugose, glabrous; blades very large, up to 15–30 cm long, 2.8–4.5 cm wide, lanceolate, hard, glabrous, the uppermost leaves near the inflorescence smaller. Small branch com-



plement with 6 branches, these 20–22 cm long, without the leaves, only inflorescences. Inflorescence 8–12 cm long; rachis and pedicels finely puberulous. Spikelets 13–15 mm long, 4 mm wide, pectinate. Glumes 2, unequal; lower glume 9 mm long, 2 mm wide, acuminate, glabrous, with 9–11 irregularly distributed nerves, the 1–3 central nerves carinate, salient, forming folds at base abaxially, many nerves anastomosing, the margins finely ciliate toward the apex; upper glume 11–12 mm long, 5 mm wide, with 17 irregular nerves, nerves mostly obliquely anastomosing, the margins finely ciliate. Lemma 10 mm long, 5 mm wide, folded, fusiform, hard, cartilaginous, yellowish, glossy, 15–17-nerved, the nerves anastomosing, irregular, evident only adaxially, the margins finely lanate toward the apex, the hairs whitish. Palea 11 mm long, 2 mm wide, folded, cartilaginous, glossy, 12-nerved, evident only adaxially, the nerves obliquely anastomosing toward the apex, narrowly sulcate, the keels and the margins finely woolly toward the apex. Rachilla extension bristlelike, 6.5 mm long, whitish, with a minute rudiment. Caryopsis not seen.

*Phenology.* The only available specimen of this species is the holotype, collected in flower in 1968.

*Distribution.* Known only from the type locality, state of Bahia, Brazil.

*Merostachys magnispicula* shows a strong morphological affinity with the material of the following collection: *Thomas, Carvalho, Jardim & Sant'Ana* 9889 (MO, NY, SP) from Bahia, Município Belmonte, Barroândia, Estação Experimental "Grigório Bondar" CEPLAC, 18 km E of BR 101 on road to Belmonte, 16°8'S, 39°15'W. Southern Bahian wet forest (tabuleiro forest), adjacent "mussununga" savana, 12 May 1993 (fl). This collection is not yet described; it differs by having the smaller spikelets 11–12 mm long, 3 mm wide, and by the presence of more developed oral setae. *Thomas et al.* 9889 also has one long flowering branch with large leaves, similar to *M. magnispicula*, without any indication as to what part of the plant it was collected from, but it may possibly come from a "major culm leaf complement" (see discussion in *M. ramosissima*). The two collections may be conspecific, although these two bamboos apparently have different flowering cycles; further collections of more complete material are needed to determine their relationship. *Merostachys magnispicula* also shows affinity to *M. rondoniensis*.

A photograph of the flowering branch of *Merostachys magnispicula* (*Almeida & Santos* 289 (CEPEC)), though unnamed, first appeared in Kobay-

ashi (1994). The specimen draws attention because of its singular and magnificent appearance.

The description of *Merostachys magnispicula* is based on a single, poor herbarium specimen; thus the morphological details of the inner ligule and the adaxial surface of the leaves could not be examined—the material was completely glued to the sheet.

***Merostachys medullosa* Sendulsky, sp. nov.**

TYPE: Brazil. Bahia: Município Porto Seguro, forested slopes of "morro" on Fazenda Carvalho, ca. 26 km W of town of Monte Pascoal, at end of road that intersects with BR 101 in Monte Pascoal, 380–460 m, 15 May 1976 (fl), *T. R. Soderstrom, Russell & Hage* 2212 (holotype, US; isotypes, CEPEC, SP). Figure 8.

Ab omnibus speciebus notis culmis maturis medullosis, foliorum culmorum setis cupreis, extensis differt.

Robust bamboo with culms 10–15 m long, 2 cm diam., growing on the upper slopes of mountains, becoming very thin at tips and arching over the vegetation. Clumps of ca. 50 culms, these gray-green, striate-mottled dark and light green, finely retrorsely scabrous, slightly pilose, the hairs appressed, white. Internodes with very thick walls and filled with soft pith, in small branches hollow. Nodes salient, light colored, densely bearded below, hairs white, long. Culm leaves deciduous; sheaths very long, ca. 50–75 cm long, 5 cm wide at the base, long-triangular, attenuate to a point apically; oral setae 1.5 cm long, scarce, sometimes very dense, copper-colored, straight or undulate; inner ligule (1.5)2–2.5 mm long, dark, membranous, shortly bifurcate, the angles not sharp, with lighter, minutely ciliate margins; outer ligule salient, concave in shape, dark rim, located below the tip of the sheath; blades deciduous, 13 cm long, 0.4 cm wide, the blade erect at first then reflexed. Branch complement with (8–)12–54 branches, these 26–34 cm long, 2–5 mm thick, glabrous, smooth. Branch leaves 10–17 per complement, the lowermost smaller; sheaths tight, densely strigose, auriculate, the upper margin ciliate, the auricles rounded, glabrous abaxially, adaxially with numerous oral setae 12–15 mm long, undulate, dark yellow or copper-colored, with long papillose bases, when the auricles reflexed, the oral setae are exposed in all directions; inner ligule a thick membrane, 0.3 mm long; outer ligule a rim; pseudopetiole dark, glabrous; blades 7–11.5 cm long, 1.6–2 cm wide, L:W = 4.3–5.7, asymmetrical, broadly and long lanceolate, attenuate apically, the margins finely scabrous, nerves not manifest adaxially.



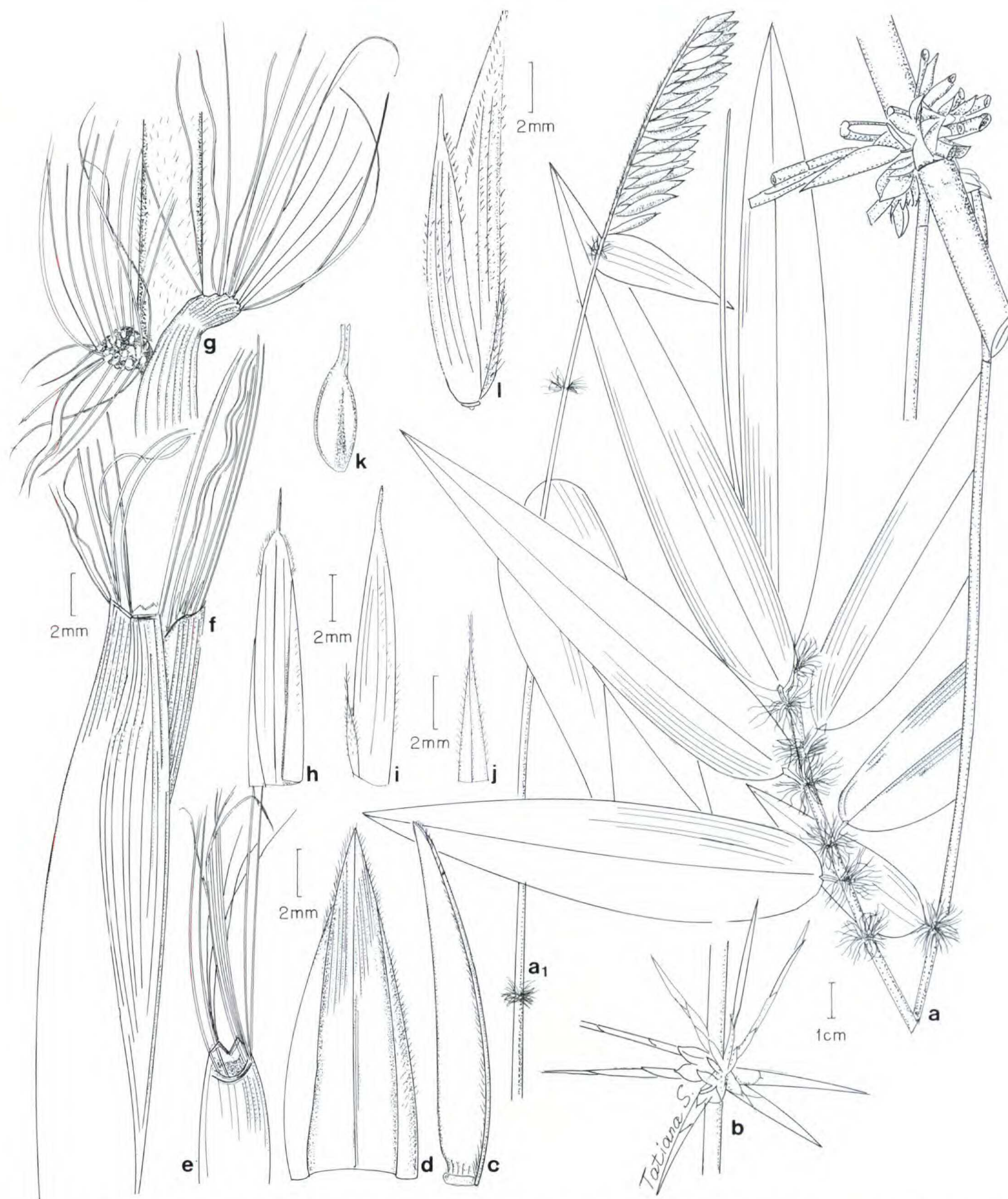


Figure 8. *Merostachys medullosa* Sendulsky. —a. Branch with leaf complement. —a<sub>1</sub>. Inflorescence. —b. Branch complement in development. —c. Palea. —d. Lemma. —e. Bifurcate ligule (abaxial side) of a culm leaf. —f. Upper part of the culm leaf. —g. Reversed position of the auricle with oral setae of the branch leaf. —h. Upper glume. —i. Lower and upper glumes (lateral view). —j. Lower glume. —k. Ovary. —l. Spikelet. Based on Soderstrom, Russell & Hage 2212.

Large sterile branch 32 cm long with large leaves 10–22 cm long, 2.5–3 cm wide present. Inflorescence 5–10 cm long, ca. 2 cm wide, terminal on leafy branches, spikelike, pectinate; rachis and pedicels densely hispid. Spikelets 16 mm long, 0.4 cm wide, densely hispid on the upper part, on the

lower finely scabrous. Glumes 2, unequal; lower glume 6 mm long, 1-nerved, densely ciliate at the margins and long hispid along the nerve; upper glume apiculate, ovate, slightly carinate, 13 mm long, 5 mm wide, hispid, densely ciliate at the margins. Internode between the upper glume and the



lemma 1 mm long, cup-shaped. Lemma 15 mm long, 8 mm wide, triangular, apiculate, ciliate at the margins, the hairs dark brown, surface densely strigose and very finely scabrous toward the base, adaxially shiny, brown, ca. 17-nerved, the nerves inconspicuous, anastomosing. Palea 16 mm long, ca. 22 mm wide, glabrous, finely ciliate at the keels, finely scabrous toward the top, with a few long hairs at the base; extension of the rachilla as long as the palea, with a minutely leaflike rudiment; ovary 6 mm long, ovoid, styles two, anthers 9 mm long, black. Caryopsis not seen.

**Phenology.** This species has been collected in flower only in 1976.

**Distribution.** Brazil, state of Bahia.

**Paratypes.** BRAZIL. **Bahia:** Município Jaguaquara, ca. 9.5 km SE of Jaguaquara, Fazenda Mundo Novo, 700 m, 13 Apr. 1976 (fl), *Calderón, Santos & Oliveira* 2379 (CEPEC, MO, US); 6–8 km E of Jaguaquara city, Fazenda Mundo Novo, ca. 13°32'30"S–39°55'W, 70 m, 6 May 1972 (st), *Calderón & Pinheiro* 2251 (CEPEC, MO, US); Município Prado, ca. 10 km S of Prado, low, littoral forest, 50 m, 12 Apr. 1976 (st), *Soderstrom, Russell & Hage* 2149 (CEPEC, US); Município Ubaira, 2 km E of Ubaira on road to Mutuipe, forest slopes above rocky stream in Fazenda Pindaba de Dentro, 475 m, 27 Apr. 1976 (st), *Soderstrom, Russell & Hage* 2166 (CEPEC, SP, US); Município Una, 15 km from Una on road to Santa Luzia do Salobro, 60 m, 27 May 1976 (fl), *Soderstrom, Russell & Hage* 2231 (CEPEC, US); 3.5 km S of Una on road Una–Santa Luzia, 25 May 1976 (fl), *Calderón, Santos & Oliveira* 2451 (CEPEC, MO, US).

*Merostachys medullosa* is distinguished from all the other species in the genus by the culm internodes filled with soft pith.

***Merostachys procerrima* Sendulsky, sp. nov.**

**TYPE:** Brazil. Bahia: Município Porto Seguro, Reserva Biológica do Pau Brazil (CEPLAC), primary hygrophilic forest with tall trees, 35 m, 7 May 1976 (st), *Soderstrom, Russell & Hage* 2187 (holotype, US; isotypes, CEPEC, SP). Figure 9.

Ab omnibus speciebus notis laminis oblongo-lanceolatis vel late-lanceolatis, 7–34 cm longis, foliorum culmorum juvenum vaginæ et laminis purpureis, setis albis, densis differt.

Slender culms of 4–5 in a clump, 3–4 m tall, 1.5 cm diam., weak, supported by shrubs and small trees, erect and glabrous below, thin and scabrous above, gray-yellowish; walls ca. 1 mm thick. Nodes salient. Culm leaves deciduous; sheaths 18 cm long, 6 cm wide, slightly asperous, adaxially shiny. According to the collectors' notes, new culm sheaths purplish green or deep purple, becoming stramineous and pushed off by developing branch-

es; blades purplish green, deciduous, reflexed, 6–7 cm long, 7 mm wide. Branch complement with 3–4 short branches, these 6–20 cm long, borne on very thin, retrorsely scabrous culms or branches, 2–4 mm thick. Branch leaves 3–8 per complement: sheaths tight, hardened, strongly nerved, sometimes dorsally carinate, auriculate; auricles straight or slightly rounded, 3 mm long, giving rise to dense line of silky-white, neat oral setae, these 1 cm long, undulate in the upper part; inner ligule dark, cartilaginous, 0.5 mm long; outer ligule a rim; the pseudopetiole 7 mm long, dark, purple to black (according to the collectors' notes); blades oblong-lanceolate, 7–20 cm long, 2.2–3 cm wide, L:W = 3.1–6.6, light green, many-nerved, but smooth on both surfaces, apically abruptly attenuate, the base asymmetrical, nerves more prominent abaxially. Bigger branches 17 cm long, 3.5 mm thick, borne on thicker culms or branches, with 6–8 larger leaf-blades 20.5–24.5 cm long, 3–3.6 cm wide, with the same characteristics as above-mentioned blades of the smaller branch complements. The third kind of branches of unknown branch complement presents branches of 43 cm long, 5 mm thick, with very strongly nerved and longitudinally wrinkled blades, these 18.5–34 cm long, 2.2–4.5 cm wide, broadly and long lanceolate, the surface with the appearance of a very old leaf, its sheaths carinate with hard, wide, dorsal keels; oral setae dark, mostly broken or fallen. Reproductive structures not seen.

**Phenology.** The species has not yet been collected in flower.

**Distribution.** Brazil. States of Bahia and Espírito Santo.

The name for this species was given by one of the collectors, the late T. R. Soderstrom, due to its elegant appearance.

**Paratypes.** BRAZIL. **Bahia:** Município Camamú on road to Ubaitaba, forest on hill above stream, 215 m, 22 Apr. 1976 (st), *Soderstrom, Russell & Hage* 2157 (CEPEC, SP, US); Município Porto Seguro, Parque Nacional Monte Pascoal, 14 km E of BR 101 at a point 13 km N of Itamarajú, 110 m, 11 May 1976 (st), *Soderstrom, Russell & Hage* 2198 (SP); Município Santa Cruz Cabrália, Reserva Biológica Pau Brazil (CEPLAC), 16 km W of Porto Seguro, ca. 16°23'S–39°11'W, 100 m, 31 Mar. 1972 (st), *Calderón & Pinheiro* 2194 (CEPEC, MO, US). **Espírito Santo:** Município Conceição de Barra, Distrito de Dunas de Itauna, Fazenda Boa Vista, 6–8 km from Dunas de Itauna, 50 m, restinga arbórea, 29 Oct. 1983 (st), *Martinelli & Soderstrom* 9710 (US).

***Merostachys ramosissima* Sendulsky, sp. nov.**

**TYPE:** Brazil. Bahia: Município Ubaira, 3 km E of Ubaira and 11 km W of Matuipe, 425 m, 26 Apr. 1976 (fl), *Soderstrom, Russell & Hage* 2164 (holotype, US; isotypes, CEPEC, SP). Figure 10.





Figure 9. *Merostachys procerrima* Sendulsky. —a. Large branch with large leaves—"major culm leaf complement." —b. Inner ligule. —c. Branching of the "side branch." —d. Leaf complement of the "side branch." —e. Upper part of the branch leaf sheath. Based on Soderstrom, Russell & Hage 2187

Ab omnibus speciebus notis ramificationibus ramificationibus, laminis longo-lanceolatis, 15–16 cm longis, 1.8–2.1 cm latis, setis flavescentibus, ad bases fuscis differt.

According to the collectors' notes, culms 12–15 m long, not erect, but arching out and reaching into the

trees, smooth except the upper scabrous parts, 2–3.5 cm diam., yellow-greenish, glabrous, sometimes shiny above the nodes; main culm producing side branches of the first order, these reaching ca. 7 m in length and again rebranching. Internodes ca. 98 cm long;



walls 1.5 mm thick. Nodes salient, densely pilose below, the hairs white. Culm leaves not falling easily; sheaths 40 cm long, 10–11 cm wide, hard, brittle, rounded on the summit, slightly auriculate, abaxially glabrous, opaque, brownish, with fine nerves, adaxially golden brown, shiny; oral setae fine, dark, 5–6 mm long, whitish and crispate at the points; inner ligule a very short, dark membrane; outer ligule a fine, dark rim; blade deciduous, reflexed, 12 cm long, 18 mm wide, hard, on both surfaces finely hispid toward the upper part. The entire “leafy branch complement of the major culm” not seen, one branch from this complement 68 cm long, 3–5 mm thick, branch leaves 12 per complement; sheaths strongly carinate, with wide, thick keel; oral setae dark at the base, whitish and crispate at the tips, ca. 5 mm long, slightly diminishing in size downward along the upper margin of the sheath; inner ligule a hard, dark membrane; outer ligule a rim; blades long-lanceolate, (2.5–)12–31 cm long, 1–4 cm wide, finely scabrous, glabrous on both surfaces, the nerves more prominent abaxially. “Side branch leaf complement” with 4–5 second order branches, these 21–23 cm long, 2.5 mm thick, branch leaves 5–7 per complement: sheaths tight, pubescent, hairs white, sometimes rather dense; oral setae yellowish, with dark bases, apically crispate, 7 mm long, in a row, slightly diminishing in size downward along the upper margin; inner ligule very short, dark, hard membrane, 0.5 mm long; outer ligule a rim; blades 15–16 cm long, 1.8–2.1 cm wide, L:W = 7.6–8.3, asymmetrical, abaxially finely scabrous and with more prominent nerves, adaxially with 2–3 lateral nerves on one side with rows of very fine prickly hairs, more dense toward the summit (not toward the base, as in other species), margins sparsely denticulate. Inflorescence 8 cm long, 4.2 cm wide, rachis 2.5 mm thick, densely hispid; spikelets paired, distichous along the rachis; pedicels adnate, hispid. Spikelets 20–22 mm long, 2.5 mm wide, long-fusiform, on summit with 3 awnlike points. Glumes 2, unequal; lower glume 1.5 mm long, apiculate, 1-nerved, ciliate on the margins and along the nerve; upper glume 10 mm long, ca. 3.5 mm wide, apiculate. Lemma 13 mm long, 7 mm wide, lanceolate, 13-nerved, aristulate, the awn 3 mm long, finely scabrous, the nerves irregularly distributed, some nerves anastomosing. Palea 13 mm long, 5 mm wide, glabrous, narrowly sulcate, 8-nerved, long-bifid, forming 2 awnlike, dark, scabrous points, these together with aristulate lemma make 3-awned apex of the spikelet. Rachilla extension nearly as long as the palea, with a minute rudiment at the apex. Caryopsis 12 mm long, 4 mm wide, dark yellow, the surface shiny, but uneven, resembling leather (one side of the caryopsis completely destroyed by insects).

*Phenology.* The only available specimen of this species, the holotype, flowered in 1976.

*Distribution.* Known only from the type locality, state of Bahia, Brazil.

According to Soderstrom’s field notes: “. . . Clumps of 3–4 spaced culms that are not erect but arch out and reach into the trees. At first, nodes break above and 3 major branches are produced, then 2 more—5. The branches borne very long and pendant; then nodes branching again. Culms 12–15 m in height. Many more branches than 5 can eventually be produced at mature nodes and only some of those elongating. It may be that in young canes, i.e., in young plants, the culms produce at first only leaf complements and no branches. In the species these hanging branches rebranch. The bamboo occurs only on the top of “serra.” Side branches to 7 m long, perhaps more. This bamboo grows in shaded, somewhat open forest, on sandy soil with light layer of humus. 1 branch found coming from the ground (fallen culms?) in which 2 branches are in flower.” See also Soderstrom’s schematical diagram “d” reproduced in Figure 10 with the following explanations:

—a<sub>1</sub>. On some nodes of some culms there are normal long leaf complements of the first order as found in other species of *Merostachys*. Those were pressed and marked as “major culm leaves” or “major culm leaf complement.” Maybe such a condition occurs in culms of young plants and branching occurs in older plants.

—b<sub>1</sub>. The branches from the main culm produce second order leaf complements at each node. These nodes with leaf complements, or branch complements, were pressed as “side branches.”

—c<sub>1</sub>. The first order side branches are up to 7 m long.

In the studied collection only one inflorescence was available and, according to the collectors’ note, from a fallen culm. The inflorescence examined was in a poor, deplorable state; the tissues were rotten, the spikelet falling into pieces at the slightest touch. Better collections of this species are desirable to enrich our understanding of its branching system.

#### SPECIES FROM RONDÔNIA

***Merostachys fimbriata*** Sendulsky, sp. nov. TYPE: Brazil. Rondônia: Macisa/Maciça/cassiterite mine, about 17 km N of São Lourenço mine on NW site of Rio Madeira, 17 July 1979 (st), *Calderón & Monteiro 2870* (holotype, MO). Figure 11.

Ab omnibus speciebus notis nodis crassis, fimbria densa, alba, longa sub nodo praedita differt.



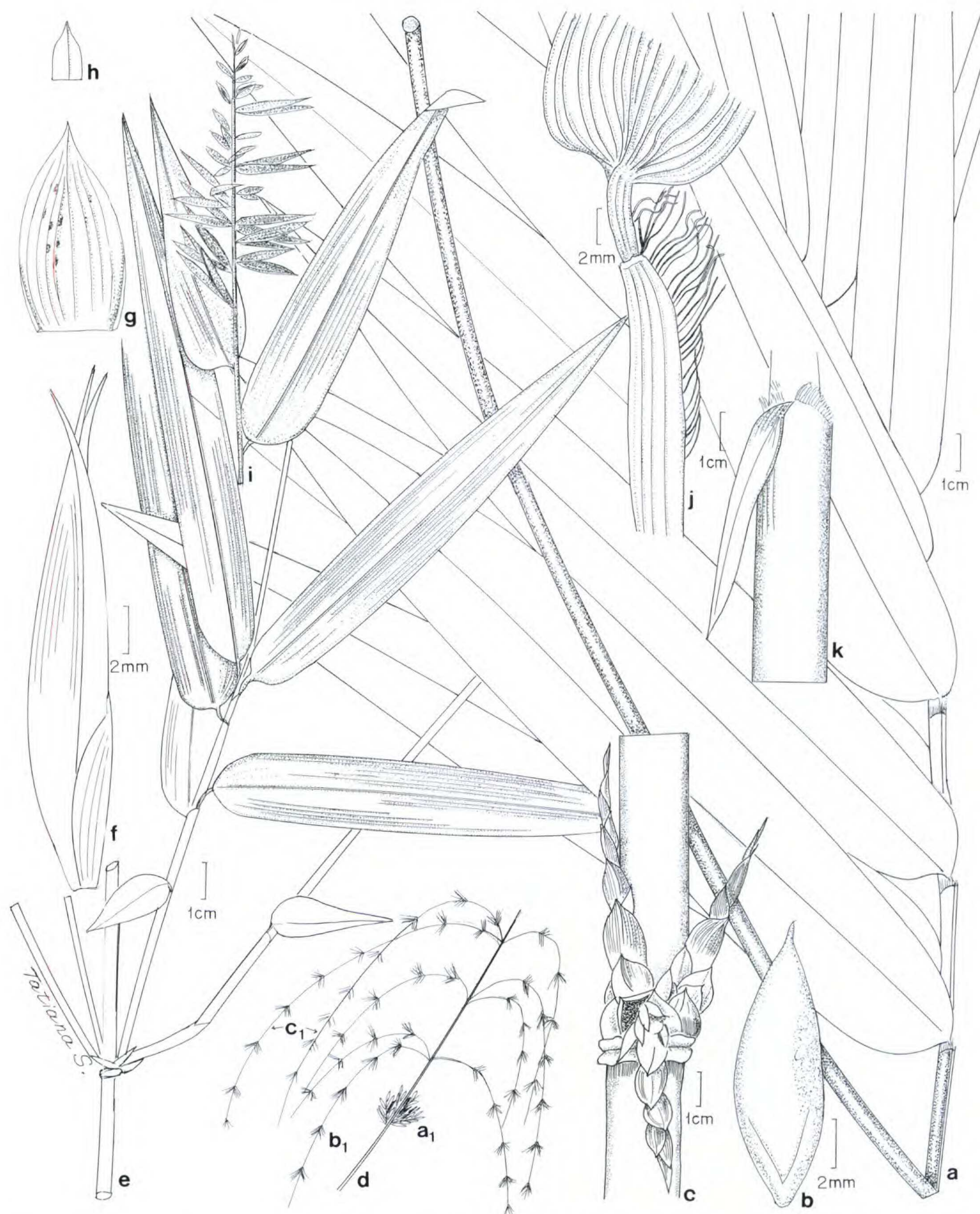


Figure 10. *Merostachys ramosissima* Sendulsky. —a. Large branch with large leaves—"major culm leaf complement." —b. Caryopsis. —c. Initial stage of branching in "major culm." —d. Soderstrom's schematic diagram (explanations in the text). —e. Leaf complement of "side branches." —f. Spikelet with aristulate lemma and long-bifid palea. —g. Upper glume. —h. Lower glume. —i. Inflorescence. —j. Sheath and oral setae of side branch leaf. —k. Culm leaf. Based on Soderstrom, Russell & Hage 2164.

Robust bamboo ca. 8 m tall, leaning on vegetation, with strong, slim culms. Internodes very long, about 1.20 m, with thick walls. Nodes salient, glabrous, with a fine ridge below, fringed with long,

whitish, dense hairs, directed downward. Culm leaf sheaths of new and thin culms 10–12 cm long, 3–3.5 cm wide, abaxially finely scabrous toward the apex, partially tomentose-velutinous toward the



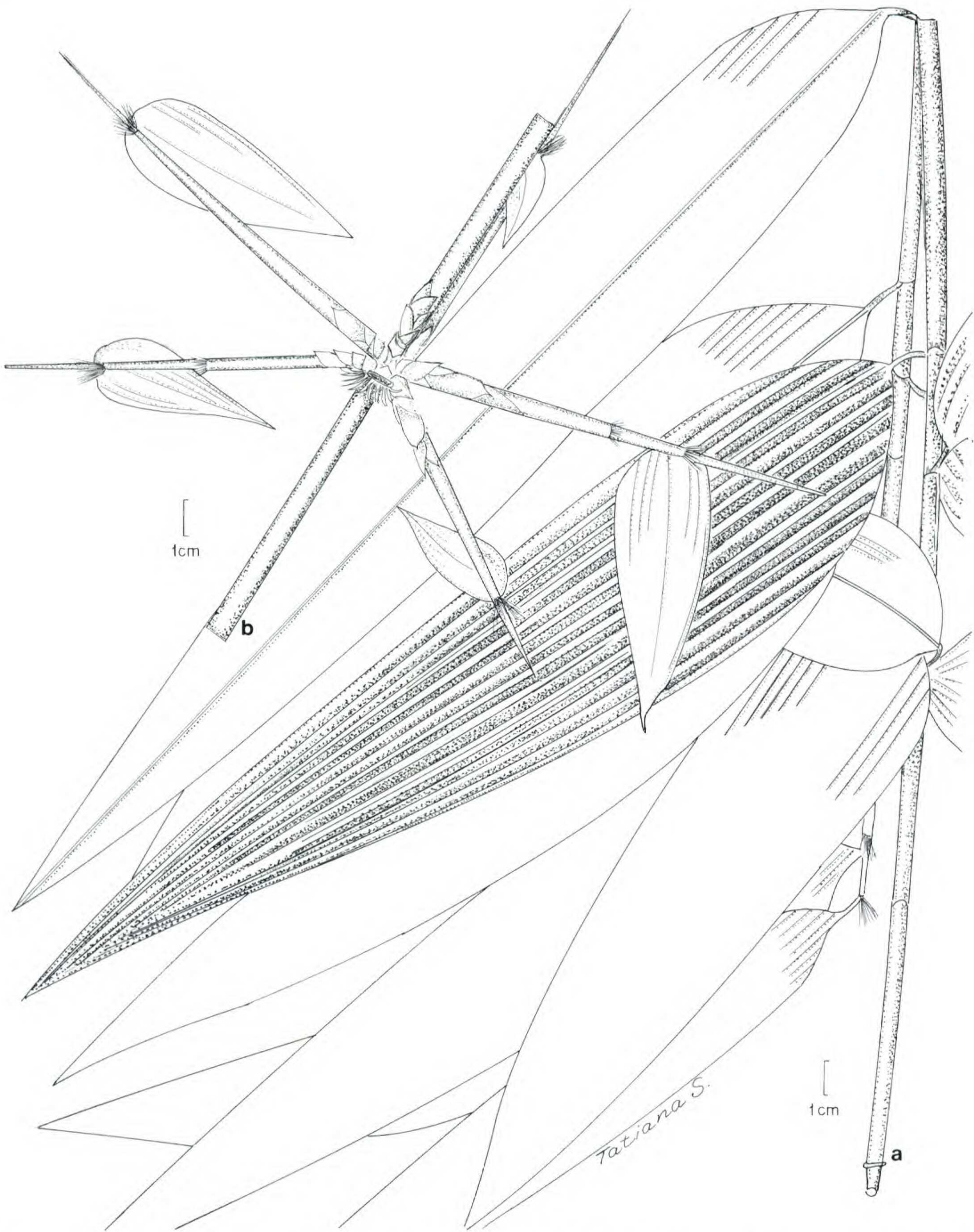


Figure 11. *Merostachys fimbriata* Sendulsky. —a. Large branch with large leaves. —b. Branch complement in development with fimbriate node. Based on Calderón & Monteiro 2870.

base, the hairs brownish, adaxially golden, shiny; inner and outer ligules inconspicuous, oral setae fine, 8 mm long, golden; blade not seen. Branch complement of 5–6 branches, these 10–12 cm long, with one broadly lanceolate leaf, 7.5 cm long, 2.6 cm wide (the leaf complement in early stage of de-

velopment). Sterile large branch 57 cm long, ca. 5 mm thick, with 14 mature leaves: sheaths tight, broadly carinate, glabrous; oral setae golden, straight, crispate at the points, 10–12 mm long; pseudopetiole 10 mm long, 3 mm wide; blades 30 cm long, 4.5–5 cm wide, long-lanceolate, attenuate



at the apex, asymmetrical, densely nerved and deeply sulcate longitudinally, the midnerve evident abaxially only. Reproductive structures not seen.

*Phenology.* The only available specimen of this species is the type, collected sterile in 1979.

*Distribution.* Known only from the type locality, state of Rondônia, Brazil.

According to the collectors' notes: "Branch complement of a few branches which in turn rebranch." The rebranching of the first order long branches is very rare in *Merostachys* and not the expected manner of growth in the genus; it is certainly known only for *M. ramosissima* from Bahia, also described here and not clearly understood. The herbarium material of *M. fimbriata* presents two kinds of branches, probably from two different branch complements—a short branch, with a few small leaves (it may correspond to Soderstrom's "leaf complement" or "branch complement of the side branches," see *M. ramosissima*), and one mature and long branch, with large and long leaves (corresponding to the branch of Soderstrom's branch from the "major culm leaf complements").

The observations of the branching were given only in the collection of *M. ramosissima* (Soderstrom, Russell & Hage 2164) and short, but clear indications in *M. fimbriata* (Calderón & Monteiro 2870) and in *M. annulifera* (Calderón, Santos & Oliveira 2405). There are no observations on the ramification in *M. procerrima* or in *M. medullosa*. Is it possible that they might all be branching species and that during collecting in the dense forest, where all branches are interlaced, this branching tendency was not observed? Only future collections may provide a clue to answer this question.

It is expected that future precisely directed collections will better show this rare and unusual branching and demonstrate the successive branching, its origins and development.

The presence of a fringe of long dense hairs, hanging from the tubiform crest below the salient node, is an autapomorphic characteristic in this species. The available material for study is very scarce and unfortunately glued to the sheet, not permitting accurate examination.

***Merostachys rondoniensis* Sendulsky, sp. nov.**

TYPE: Brazil. Rondônia: Manaus–Porto Velho Highway, 7 km N of Porto Velho, growing in secondary forest near the road, 7 July 1979 (fl), Calderón, Monteiro & Gedes 2780 (holotype, MO). Figure 12.

*M. magnispiculae* similis sed laminis ramorum florifer-

orum 4–13.5 cm longis et 1–2.4 cm latis, spiculis 15–17 mm longis et 4 mm latis differt.

Habit unknown. Culms finely retrorsely scabrous, 1.5 cm diam., with very thin walls. Nodes dark, salient, finely pilose on lower part and below, the hairs white, sometimes forming a white line. Culm leaves deciduous; sheaths 12 cm long, 4–5 cm wide, light brown, abaxially very sparsely pilose, the hairs fine, whitish, adaxially golden, smooth, shiny; oral setae light yellow, ca. 5 mm long, dense; inner ligule ca. 1 mm long, a thick, dark membrane; outer ligule slightly curved and wider in the middle; blades deciduous, not seen. Normal branch complement with 27–30 branches, these short, thick, 10–22 cm long, with 4–5 leaves before the inflorescence, all other branch complements leafless or with small, broadly lanceolate leaves, 4 cm long, 16–20 mm wide, with flowers only. Branch leaves with sheaths tight, glabrous, broadly carinate, finely transversely rugose, the upper margin finely ciliate; oral setae 7–8 mm long, erect, brownish, sometimes crispate; inner ligule a short, dark membrane; outer ligule an inconspicuous rim; blades long lanceolate, 4–13.5 cm long, 1–2.4 cm wide, L:W = 4–5.6, glabrous, 3–4 lateral nerves on one side with rows of fine prickly hairs, these denser toward the base. Inflorescence spike-like, 8–9 cm long. Spikelets 15–17 mm long, 4 mm wide, pectinate or distichally arranged, some undeveloped spikelets present. Glumes 2, unequal; lower glume 7 mm long, 3 mm wide, finely puberulent, carinate; upper glume 9 mm long, 5 mm wide, lanceolate, glabrous, 9-nerved, finely ciliate toward the apex, the hairs whitish. Both glumes finely dark-spotted adaxially. Lemma 14 mm long, 7 mm wide, lanceolate, glabrous, 18–19-nerved, nerves anastomosing, adaxially dark-spotted, margins ciliate, cilia denser toward the apex. Palea 13–14 mm long, folded, 2.5 mm thick, 10-nerved, all nerves irregular. Rachilla extension 11 mm long, flat, finely pilose, with an inconspicuous rudiment at the apex. Stamens 3; anthers brownish, 11 mm long. Caryopsis not seen.

*Phenology.* The only available specimen of this species is the type, collected in flower in 1979.

*Distribution.* Known only from the type locality, state of Rondônia, Brazil.

*Merostachys rondoniensis* shows a strong affinity with *M. magnispicula* in spikelet morphology. Their spikelets differ in size by just a few millimeters, but the size of their glumes differs. Unfortunately, as complete vegetative organs of both species are not available for study, they cannot be compared vegetatively. Apparently, *M. rondoniensis* was col-



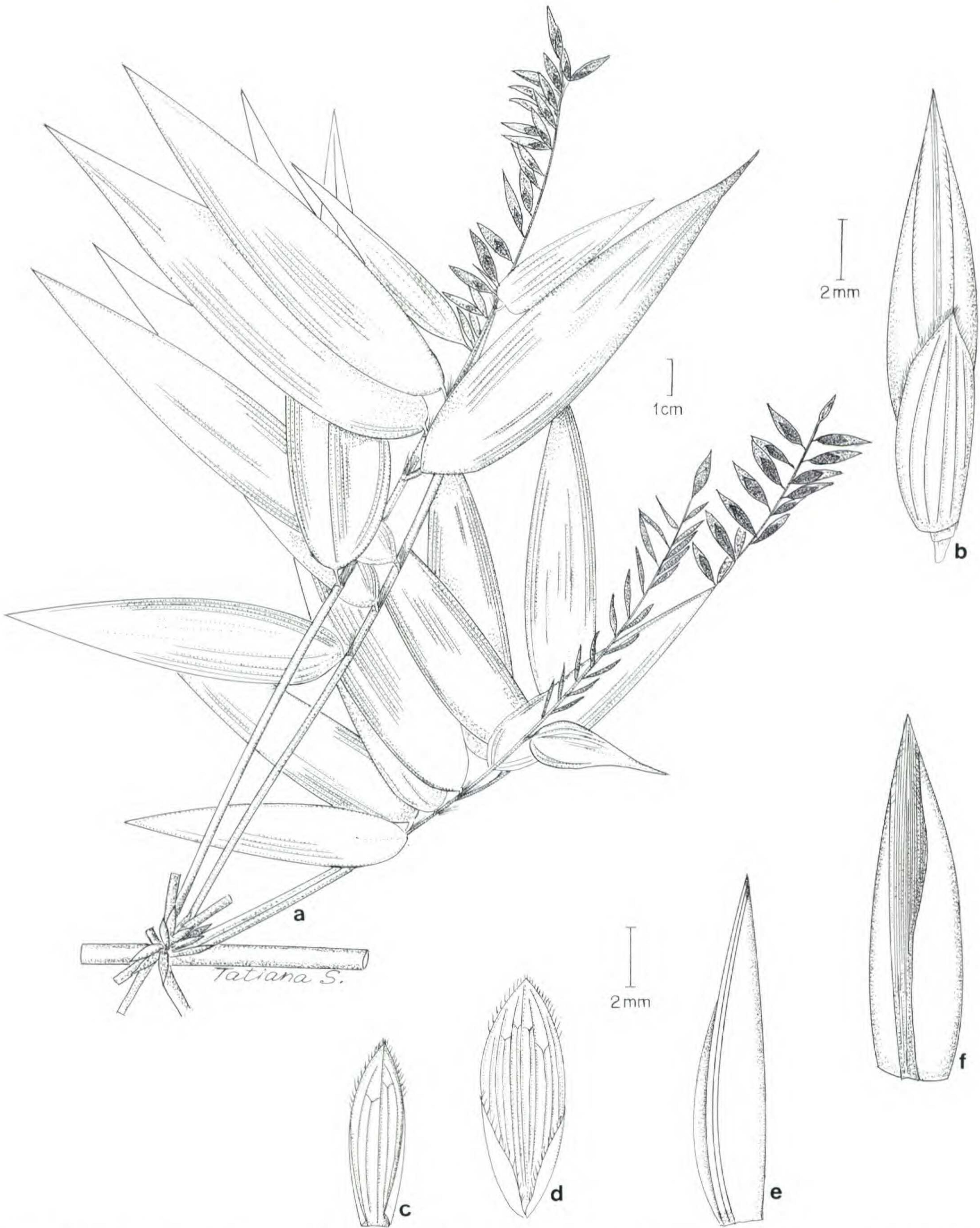


Figure 12. *Merostachys rondoniensis* Sendulsky. —a. Part of the branch complement. —b. Spikelet. —c. Lower glume. —d. Upper glume. —e. Palea. —f. Lemma. Based on Calderón, Monteiro & Guedes 2780.

lected under flowering stress; the comparison of the reproductive structures of these species is not entirely reliable, as stress flowering tends to produce abnormal inflorescences and spikelets.

It is hoped that future collections of these species will help to clarify their true affinities.

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